Does High School Economics Make a Difference?

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ABSTRACT. Since the 1990s, increasing amounts of resources have been devoted to teaching economics in grades K – 12. This raises the question of how these increased resources have impacted students entering college economics courses. This paper attempts to measure the impact high school economics courses have on students enrolled in college-level principles of macroeconomics courses at a Midwestern university. An OLS model is run on student performance on a pretest and posttest of economic knowledge, as well as on the percentage change in performance on the pretest and posttest. A probit model is run on students' course grades. Results indicate that for students enrolled in this course, completing a high school economics course has no impact on any of the aforementioned variables. It is hoped that this result will be a stepping-stone in painting the current picture of economic education in grades K – 12 in the United States and that such a picture will bring with it policy discussions as to how to most effectively use resources in this area to achieve desired results with respect to economic literacy. (A2, A20, A22)

I. Introduction

The Council for Economic Education (CEE) states that "educating young people in economics …is vital to our nation's competitive future." (CEE, 2007, p. 2) Apparently, states agree. More economic education has been incorporated into classrooms, a greater number of states are requiring students to take economics courses in high school, and - as of 2009 - all 50 states and the District of Columbia have implemented economic standards for grades K – 12 and included some type of economics curriculum for these grade levels. (CEE, 2011) Past studies show that incorporating economics into grades K – 12 has mixed results on economic literacy. No recent study has examined the efficacy of committing even more resources to economic literacy in these grades; however, the 2012 National

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Assessment of Educational Progress, otherwise known as "the nation's report card," calls into question how successful the integration of economics in grades K – 12 has been. The report card indicates that more than half of students leave high school without a proficient knowledge of economics. (National Assessment of Educational Progress, 2012)

A new study examining the impact of resources being devoted to economic education in grades K – 12 seems most timely. This paper makes an initial attempt by looking at the impact of high school economics education on student performance in a one-semester principles of macroeconomics course at a Midwestern university. This is the first college economics course taken by students at the university and is a prerequisite for principles of microeconomics. It is taken by a wide variety of majors on campus including all business majors.

All students in the course were given the opportunity to participate in this study, which consisted of a survey, a pretest, and a posttest.[1] The pretest and posttest were identical with questions covering the main topics taught by the instructors of the course at the university. These topics include: the production possibilities frontier and opportunity cost, demand and supply, unemployment and inflation, aggregate demand and aggregate supply, and monetary and fiscal policies.

OLS regressions were run on the students' pretest and posttest scores and on a variable "gapclose," the percentage difference between posttest and pretest scores. In addition, an ordered probit regression was run on students' course grades. Results show completing high school economics has no significant impact on any of the dependent variables.[2]

Given that more resources are being devoted to economic education in grades K – 12 and given the opportunity cost of using these resources, we hope this paper will further the discussion as to why students who are receiving economic education in grades K – 12 are putting in such lackluster performances as demonstrated by our study's results as well as by the nation's report card. Once there is greater understanding as to the cause of these poor outcomes, it is hoped that policies designed to increase the efficacy of K – 12 economics education can be explored and implemented.

Following is a brief highlight of some of the past literature on this topic. This review is followed by an outline of the details of this study. We then discuss the data and models used to estimate the impact of high school economics on student pretest score, student posttest score, gapclose,

and student course grade. This is followed by sections describing the results of the models estimated and the conclusions that can be drawn from these results.

II. Literature Review

Several studies have investigated the impact completing a high school economics course has on students taking college level principles of economics courses. These studies are similar in that they use regression analysis to examine the impact completing high school economics has on the stock of economic knowledge a student possesses at the beginning of their college course and/or on student performance in their college principles course. Unfortunately, as Table 1 demonstrates, past literature does not paint a clear picture as to how completing an economics course in high school impacts those students who go on to take a college economics course. Results range from those studies in panel A - Myatt and Waddell (1990) and Brasfield, Harrison, and McCoy (1993) - showing that completing an economics course in high school has an unequivocal positive impact on students taking a college level principles course to the results of studies in panel B - Reid (1983) and Shipley and Shetty (2008) - showing that completing an economics course in high school has an unequivocal negative impact on students taking a college level principles course. In between these two extremes are the results of studies presented in panel C of the table showing that the impact of high school economics on those taking college economics is mixed. These studies include Saunders (1970), Moyer and Paden (1968), Palmer, Carliner, and Romer (1979), Lopus and Maxwell (1994), and Lopus (1997). The reader is referred to table 1 for a summary of each of these studies.

Of the studies presented in Table 1, Lopus (1997) is perhaps the most definitive as she had access to a national database. Lopus collected data from the national norming for the 3rd edition of TUCE, TUCE-III.[3] The data included 2,888 students from 53 colleges and universities taking the macroeconomics portion of TUCE-III as a pretest and posttest and 3,052 students from these same colleges and universities taking the microeconomics portion of TUCE-III as a pretest and posttest. Lopus found those students taking a high school economics course with a macroeconomics focus answered more questions correctly on the macroeconomics portion of TUCE-III when TUCE-III was given as a pretest; however, these students fared no better on the macroeconomics portion of TUCE-III as a posttest than their counterparts.

TABLE 1–The Impact of High School Economics

Study	Sample Size/Location	Dependent Variables	Effect of HS Economics
Panel A: Studies Showing a Positive Impact			
Myatt & Waddell (1990)	928 students graduating from a high school in Atlantic Coast and completing college economics at a small Atlantic Coast college	Course grade (%)	Positive
Brasfield, Harrison, & McCoy (1993)	591 macroeconomics students at Murray State	Course grade	Positive
	528 microeconomics students at Murray State	Course grade	Positive
Panel B: Studies Showing a Negative or No Impact			
Reid (1983)	All students completing introductory course at small liberal arts college in Ontario	Course grade	Negative
Shipley & Shetty (2008)	Students enrolled in Economics for Elementary Teachers	Pretest score TEL	Insignificant
	Students enrolled in macroeconomics	Pretest score TEL	Insignificant
	Students enrolled in microeconomics	Pretest score TEL	Insignificant
Panel C: Studies Showing Mixed Results			
Moyer & Paden (1968)	281 students enrolled in principles of economics course taught by television at University of Illinois	Pretest score on non-standardized exam	Positive
		Posttest score on non-standardized exam	Insignificant
Saunders (1970)	2,137 students completing one-semester sophomore introductory economics course at Carnegie-Mellon	Course grade	Insignificant
		Time spent studying for economics	Negative
		Interest in economics	Insignificant
		Rating of instructor	Insignificant
		Posttest score for TEU	Positive
		Posttest score for TUCE-I	Positive if course grade included; insignificant otherwise
		Correct answers on recognition & understanding questions on TUCE-I	Positive
		Correct answers on simple application questions for TUCE-I	Insignificant
		Correction answers on complex application questions for TUCE-I	Insignificant

TABLE 1, continued–The Impact of High School Economics

Panel C, continued: Studies with Mixed Results			
Study	Sample Size/Location	Dependent Variables	Effect of HS Economics
Palmer, Carliner, & Romer (1979)	All students taking the microeconomics portion of an introductory course at University of Western Ohio	Pretest scores on non-standardized test	Positive
		Posttest scores on non-standardized test	Insignificant
		Course grade	Negative
Lopus & Maxwell (1994)	All students enrolled in 13 microeconomics and macroeconomics courses at medium-sized California public university	TUCE III	
		Macro pretest score	Insignificant
		Macro posttest score	Insignificant if all students in sample; Positive for students taking hs macro if only students taking hs economics included in sample
		Micro pretest score	Insignificant if all students in sample; Positive for students taking hs micro if only students taking hs economics included in sample
		Micro posttest score	Insignificant regardless of sample
Lopus (1997)	Data on 2,888 students from 53 universities taking macro TUCE-III and on 3,052 students from 53 universities taking micro TUCE-III	TUCE III	
		Macro overall pretest score	Positive for students with hs macro, insignificant otherwise
		Macro pretest score - recognition & understanding questions	Positive for students with hs macro, insignificant otherwise
		Macro pretest score - explicit application questions	Insignificant
		Macro pretest score - implicit application questions	Insignificant
		Macro overall posttest score	Insignificant
		Macro posttest score - recognition & understanding questions	Insignificant
		Macro posttest score - explicit application question	Insignificant
		Macro posttest score - implicit application	Insignificant

TABLE 1, continued–The Impact of High School Economics

Panel C, continued: Studies with Mixed Results			
Study	Sample Size/Location	Dependent Variables	Effect of HS Economics
Lopus (1997), (continued)	Data on 2,888 students from 53 universities taking macro TUCE-III and on 3,052 students from 53 universities taking micro TUCE-III	TUCE III	
		Micro overall pretest score	Positive for students with hs micro, insignificant otherwise
		Micro pretest score - recognition & understanding questions	Insignificant
		Micro pretest score - explicit application questions	Insignificant
		Micro pretest score - implicit application questions	Positive for students with hs micro, insignificant otherwise
		Micro overall posttest score	Positive for students taking any hs economics
		Micro posttest score - recognition & understanding questions	Positive for students taking any hs economics
		Micro posttest score - explicit application question	Positive for students taking any hs economics
		Micro posttest score - implicit application	Positive for students with hs micro, insignificant otherwise

Students who took a high school economics course with a microeconomics focus answered more questions correctly on the microeconomics portion of TUCE-III as a pretest and as a posttest. Students taking any high school economics course, regardless of focus, answered more questions correctly on the microeconomics portion of TUCE-III as a posttest.

Statistically, Lopus' results support the idea that high school economics has positive benefits for students taking college level economics principles courses. Her results tell us that at a minimum, students completing a high school economics course with a macroeconomic or a microeconomic focus begin their college principles course with a greater stock of economic capital than their counterparts. However, examining the size of the coefficients on Lopus' independent variables presents a different story.

Her study shows that students completing a high school economics course with a macroeconomics focus answered approximately one more question correctly on the macroeconomics TUCE-III pretest than their counterparts and were on par with their counterparts on the macroeconomics TUCE-III posttest. Students completing a high school economics course with a microeconomics focus answered approximately 0.74 more questions correctly on the microeconomics TUCE-III pretest and approximately 1.4 more questions correctly on the microeconomics TUCE-III posttest than their counterparts. Those students taking other types of high school economics answered no more questions correctly than their counterparts on the microeconomics TUCE-III pretest and approximately 0.84 more questions correctly on the microeconomics TUCE-III posttest than their counterparts. These students fared no better than students who had not taken a high school economics course on the macroeconomics TUCE-III pretest or posttest.

While statistically significant, the size of the high school coefficients in Lopus' study certainly seems to call into question the efficacy of high school economics. Given the resources devoted to this activity at the time of the Lopus study, one has to ask if it would be reasonable to expect a better outcome, i.e. larger coefficients. Since Lopus' study, even more resources have been devoted to economic education in grades K – 12. What has been the impact of increased attention to economics in these grades?

The following sections detail our study which makes an initial attempt to answer this question. Because our sample is from a group of students at a single university, it is limited in size. However, it is hoped that future studies can add to our results and paint a more complete picture as to how the additional resources devoted to economic education in grades K – 12 are impacting economic literacy.

III. Details of Study

Principles of macroeconomics is the first college level economics course taken by students at the university and is a prerequisite for principles of microeconomics. All instructors teaching principles of macroeconomics at the university agreed to participate in this study. Those participating ranged from tenure/tenure track professors with terminal degrees in economics to adjunct instructors with master's degrees in business

administration. Prior to the first day of class, all instructors were given a packet containing the student survey, the pretest/posttest, and instructions for administering the survey and pretest/posttest. The posttest was identical to the pretest administered by instructors.

In order to encourage students to put forth their best effort on these tests, instructors provided bonus points for each correct answer on the pretest. Student effort on the posttest was encouraged by the fact that the posttest was given as part of the student's final exam and was used in determining the student's course grade.

Students participating in the study were given the student survey and the pretest on the first day of class. Students completed the survey and then took the pretest. In order to prevent bias on responses to the survey or pretest, no information on the course was given until the second class meeting.

Questions on the survey were designed to capture information on student demographics, student ability, student experience with high school economics, and student college experience. The questions on the pretest/posttest covered the basic topics that all principles of macroeconomics instructors at the university teach during the course: production possibilities frontier and opportunity cost, demand and supply, unemployment and inflation, aggregate demand and aggregate supply, and monetary and fiscal policies.

Because we wanted to measure the specific content of the course (Bonello, Swartz, and Davisson 1984), we developed the pretest/posttest from the test bank provided by the authors of the text used by all instructors teaching the course. The exam was subject to a review process that included other instructors in the department and students who had recently taken the course at the university. The review process was designed to ensure clarity of exam questions and to ensure topic coverage on the exam was congruent with topic coverage in the course.

A total of 363 students completed the survey and pretest. All students still enrolled in the principles of macroeconomics courses at the end of the semester took the posttest. 290 students were included in this study. This lower number is accounted for by student drops from the course and from incomplete information on some surveys. T-tests and Z-tests indicate course grade is the only variable that is significantly different between the sample of students in the study and the population of students completing the principles of macroeconomics courses. The average course grade of the

290 students included in the study was 2.51 while the average course grade earned by the 330 students completing the course was 2.37.

IV. Data and Model

Table 2 shows the mean and standard deviation of the dependent and independent variables and provides a brief description of each variable. Previous studies have used pretest scores, posttest scores, course grades, or some combination as dependent variables measuring economic knowledge. We use all three measures and another measure, gapclose, in order to obtain as complete a picture as possible of economic knowledge and learning. Gapclose is the percentage difference between the number of questions a student answered correctly on the posttest and pretest and serves as a proxy for student learning over the semester.

As shown in Table 2, on average, students answered 8.9 or 35.6% of the questions correctly on the pretest and 17.0 or 68% of the questions correctly on the posttest. The mean for gapclose of approximately 110 indicates that the average improvement in scores was 110%, i.e. students answered approximately 9 more questions correctly on the posttest than on the pretest.

The independent variables used in this study can be grouped into four categories: student background characteristics, innate ability, high school inputs, and college inputs. The following comments may clarify questions with respect to these variables. First, given that the university has many first-generation college students, it is not surprising that only 48.6% of students' mothers and 41.7% of students' fathers had a college degree. A note should also be made with respect to the ACT score. Only 230 of the 290 students in the study had an ACT score recorded with the university; however, the student survey administered in class asked students the range of their ACT score. In order to use the larger sample size, we used a dummy variable equal to one if the student's self-reported ACT score exceeded 23 and equal to zero otherwise. This score put the student in the 70th percentile or better of all the students in the class. When comparing self-reported scores with university records, we found only four instances where the self-reported scores were inaccurate, so we felt comfortable using students' self-reported scores.

TABLE 2–Description of Variables

Variable	Description	Mean	Standard Deviation
Dependent Variables			
Pretest	Number of question correct	8.94	2.72
Posttest	Number of questions correct	17.04	3.66
Gapclose	Percentage difference between questions correct on the posttest and pretest–a measure of learning	109.87	94.92
Grade	Course grade on a 4.0 scale	2.51	1.22
Independent Variables			
Student Background Variables			
Male	Percentage male	0.64	0.48
African American	Percentage African American	0.11	0.32
Other minority	Percentage other minority	0.08	0.27
Mother has college degree	Percentage students whose mother graduated college	0.49	0.50
Father has college degree	Percentage students whose father graduated college	0.42	0.49
Innate Ability			
ACT greater than 23	Categorical variable = 1 if ACT > 23 or = 0 if ACT ≤ 23	0.31	0.46
Honors program	Categorical variable = 1 if in Honors program or = 0 otherwise	0.05	0.21
High school inputs			
High school college track	Categorical variable = 1 if student was enrolled in high school college track courses or = 0 otherwise	0.35	0.48
High school economics	Categorical variable = 1 if student took high school economics or = 0 otherwise	0.18	0.38
College inputs			
College calculus	Categorical variable =1 if student received a passing grade in college calculus or = 0 otherwise	0.12	0.33
Current GPA	Student's current college grade point avg.	2.89	0.67
Completed > 30 credit hrs	Categorical variable = 1 if student completed > 30 college credit hrs or = 0 if completed ≤ 30 college credit hrs	0.56	0.50
Current hours enrolled	Number of hrs in which the student is currently enrolled	14.76	1.98
Business major	Categorical variable = 1 if student is a business major or = 0 otherwise	0.35	0.48
Math/Science major	Categorical variable = 1 if student is a math or science major or = 0 otherwise	0.08	0.27
Microecon in college	Categorical variable = 1 if student received a passing grade in college micro or = 0 otherwise	0.09	0.28
Repeating course	Categorical variable = 1 if student retaking macro principles or = 0 otherwise	0.10	0.30
Instructor 1	Categorical variable = 1 if instructor is instructor 1 or = 0 otherwise	0.36	0.48
Instructor 2	Categorical variable = 1 if instructor is instructor 2 or = 0 otherwise	0.16	0.37
Instructor 3	Categorical variable = 1 if instructor is instructor 3 or = 0 otherwise	0.09	0.29
Large Class	Categorical variable = 1 if class size > 40 or = 0 if class size ≤ 40	0.36	0.48

It may be of interest to note that T-tests and Z-tests indicated that students who took a high school economics class were more likely to be a minority, either African American or other, and were more likely to be in the honors program. While participation in the honors program is not surprising, we did - because of results from previous work - find the minority results somewhat surprising. The dummy variable for calculus was used as a measure of mathematical preparation. College algebra was not used, as the majority of students taking principles of macroeconomics had previously completed college algebra. Although this is a principles class, it is not surprising that 55.9% of students surveyed had completed more than 30 hours of college credit. Academic advisors at the university try not to place first-year college students in this course, as first-year students have a poor record of success in principles of macroeconomics. We felt the inclusion of business major and math and science major as independent variables was important. All business majors are required to take principles of macroeconomics and to complete the course with at least a C. This grade requirement may provide extra motivation to business students versus students in other majors. Math and science majors tend to have a more stringent analytical background than other majors, so these students were also highlighted in the study. Finally, microeconomics was included as an independent variable. Some transfer students have taken microeconomics at the college level prior to enrolling at the university. Other students may have received a special exception to take microeconomics prior to taking the macroeconomics course. Students completing microeconomics may perform better relative to students who have not taken a college economics course.

OLS models are used to estimate pretest score, posttest score, and gapclose. These models are represented in equations 1 – 3.

$$Y_{Pretest} = \beta_{1,0} + \boldsymbol{\beta}_{1,\mathrm{SB}}\mathbf{X}_{Student\ Background} + \boldsymbol{\beta}_{1,IA}\boldsymbol{X}_{Innate\ Ability} + \boldsymbol{\beta}_{1,HSI}\boldsymbol{X}_{High\ School\ Inputs} + \boldsymbol{\beta}_{1,CI}\boldsymbol{X}_{1,College\ Inputs} + \varepsilon_1 \quad (1)$$

$$\mathrm{Y}_{Posttest} = \beta_{2,0} + \boldsymbol{\beta}_{2,\mathrm{SB}}\mathbf{X}_{Student\ Background} + \boldsymbol{\beta}_{2,IA}\boldsymbol{X}_{Innate\ Ability} + \boldsymbol{\beta}_{2,HSI}\boldsymbol{X}_{High\ School\ Inputs} + \boldsymbol{\beta}_{2,CI}\boldsymbol{X}_{2,College\ Inputs} + \varepsilon_2 \quad (2)$$

$$\mathrm{Y}_{Gapclose} = \beta_{3,0} + \boldsymbol{\beta}_{3,\mathrm{SB}}\mathbf{X}_{Student\ Background} + \boldsymbol{\beta}_{3,IA}\boldsymbol{X}_{Innate\ Ability} + \boldsymbol{\beta}_{3,HSI}\boldsymbol{X}_{High\ School\ Inputs} + \boldsymbol{\beta}_{3,CI}\boldsymbol{X}_{3,College\ Inputs} + \varepsilon_3 \quad (3)$$

In each of these models, $\boldsymbol{\beta}_{i,j}$ (i = 1, 2, 3; j = *SB, IA, HSI, CI*) are vectors of coefficients to be estimated. $\mathbf{X}_{Student\ \ Background}$ is a vector of student background variables including male, African American, other minority, mother has a college degree, and father has a college degree. $\mathbf{X}_{Innate\ Ability}$ is a vector of variables representing innate abilities. These variables include ACT greater than 23 and honors program member. $\mathbf{X}_{High\ \ School\ \ Inputs}$ is a vector of high school inputs which includes high school college track and high school economics class. In model 1, which estimates pretest score, $\mathbf{X}_{College\ Inputs}$ is a vector of college inputs, which includes college calculus, current grade point average, completed more than 30 credit hours, business major, math/science major, microeconomics course, and repeating course. In model 2, which estimates posttest score, $\mathbf{X}_{College\ Inputs}$ is a vector of college inputs that includes all variables from model 1 as well as current hours, dummy variables for instructor-one, instructor-two, instructor-three, and large class. Pretest score is also included in this vector. In model 3, where gapclose is estimated, $\mathbf{X}_{College\ Inputs}$ is a vector of college inputs, which, other than exclusion of pretest score, is the same vector as that used in model 2. ε_i is the OLS random error term.[4]

An ordered probit model is used to estimate the discreet dependent variable course grade.

$$Y_{Grades} = f(\mathbf{X}_{Student\ Background}, \mathbf{X}_{Innate\ Ability}, \mathbf{X}_{\ High\ School\ Inputs}, \mathbf{X}_{4,\ College\ Inputs}) \qquad (4)$$

$\mathbf{X}_{Student\ Background}$, $\mathbf{X}_{Innate\ Ability}$, and $\mathbf{X}_{High\ School\ Inputs}$, are the same vectors used in the OLS regressions. $X_{4,College\ Inputs}$ is a vector of college inputs including college calculus, current grade point average, completed more than 30 credit hours, current hours enrolled, business major, math/science major, microeconomics course, repeating course, instructor-one, instructor-two, instructor-three, large class, and posttest score.

With regards to model 2 in which posttest questions answered correctly is the dependent variable, a key issue is whether or not the number of pretest questions answered correctly can be included as an explanatory variable or whether it is correlated with the error term. We used a version of the Hausman Test (Hill, Griffiths, and Judge, 2001) to test the null hypothesis of no correlation between the correct answers on the pretest and the error term in the posttest regression. We were unable to reject the null hypothesis at any reasonable level of significance. This allowed us to use the number of questions answered correctly on the pretest – an indicator of

a student's initial stock of economic capital – as an independent variable in the model 2.

The same issue applies to model 4 where the number of posttest questions answered correctly is used as an explanatory variable for course grade. Again, using the same instrumental variable approach, we were unable to reject the null hypothesis of no correlation between the posttest questions answered correctly and the error term in the regression of the course grade. Therefore, we were able to use the number of posttest questions answered correctly as an explanatory variable in model 4.

V. Results

In Table 3 we report the findings for all four dependent variables: pretest, posttest, gapclose, and course grade. There were no indications of heteroscedasticity in the pretest, posttest, or grade models; however, the Breusch-Pegan test indicated heteroscedasticity in the gapclose model. Because of this, a heteroscedasticity robust covariance matrix was used for the standard errors in the gapclose regression.

Of the student background variables, male is important only in explaining gapclose. Other minority is negative and significant in explaining pretest scores, and mother has college degree is negative and significant in explaining gapclose.

Being in the honors program is positive and significant in explaining pretest scores, and ACT greater than 23 is positive and significant in the posttest model. Innate ability variables are insignificant in the posttest and course grade models.

Of the college input variables, current grade point average seems to be the most helpful in explaining student performance in macroeconomics principles. It is positive and significant in the posttest, gapclose, and grade models. Students who had completed college calculus, performed better on the pretest, but otherwise had no advantage. Completing more than 30 credit hours helps on both pretest and posttest, but is otherwise insignificant. Major can be important. Math and science majors answered more posttest questions correctly than their counterparts. Interestingly, business majors answered more questions correctly on the pretest than other majors, performed worse on gapclose than other majors, and earned a higher grade than other majors. Students who had completed a college microeconomics course performed better on the pretest, but had no advantage in the other models.

TABLE 3–Regression Results

MODEL DEPENDENT VARIABLE	OLS PRETEST	OLS POSTTEST	OLS# GAPCLOSE	ORDERED PROBIT GRADE
Student Background				
Male	0.013 (0.298)	0.292 (0.397)	19.163* (11.337)	0.250 (0.161)
African American	-0.485 (0.506)	-0.562 (0.605)	14.348 (15.900)	0.357 (0.244)
Other minority	-1.173* (0.631)	0.222 (0.694)	49.356** (21.137)	-0.287 (0.276)
Mother has college degree	0.239 (0.312)	-0.172 (0.383)	-23.230** (11.400)	-0.072 (0.153)
Father has college degree	-0.049 (0.323)	0.144 (0.399)	-6.419 (9.046)	-0.061 (0.161)
Innate Ability				
ACT greater than 23	0.508 (0.319)	1014** (0.418)	3.828 (9.317)	0.045 (0.172)
Honors program member	1.704** (0.808)	1.330 (0.911)	-12.958 (20.958)	0.604 (0.464)
High School Inputs				
High school college track	-0.405 (0.306)	0.191 (0.384)	6.387 (9.476)	0.099 (0.153)
High school economics class	-0.166 (0.358)	-0.457 (0.478)	-15.880 (10.237)	0.060 (0.193)
College Inputs				
College calculus	2.047*** (0.539)	0.801 (0.613)	-35.543*** (12.716)	0.271 (0.248)
Current grade point average	0.182 (0.235)	1.514*** (0.308)	17.242*** (6.617)	1.735*** (0.146)
Completed more than 30 credit hours	0.614** (0.302)	0.684* (0.389)	-4.041 (10.910)	0.164 (0.155)
Current hours enrolled		-0.068 (0.094)	-1.801 (2.507)	-0.029 (0.038)
Business major	0.656** (.0317)	0.175 (0.412)	-29.267** (12.469)	0.492*** (0.166)
Math/Science major	-0.647 (0.607)	1.298* (0.729)	25.843 (17.956)	0.241 (0.302)
Micro college course	1.492** (0.680)	0.670 (0.705)	-22.487 (15.152)	0.244 (0.265)
Repeating course	0.552 (0.535)	-0.403 (0.671)	-22.955 (14.745)	-0.228 (0.265)
Instructor-one		0.264 (0.429)	3.826 (12.006)	2.175*** (0.193)
Instructor-two		-3.192*** (0.571)	-58.804*** (15.515)	1.078*** (0.236)
Instructor-three		0.030 (0.682)	-13.588 (15.122)	1.597*** (0.275)
Large class		0.523 (0.444)	17.954 (13.180)	0.189 (0.180)
Pretest		0.277*** (0.073)		
Posttest				0.149*** (0.024)
Adjusted R-squared	0.16	0.35	0.10	0.42[##]
F-statistic for OLS / Chi Squared Statistic for Ordered Probit	4.400***	7.909***	2.500***	368.603***

Standard errors derived using a heteroscedasticity robust covariance matrix, [##]McFadden Pseudo R-squared; *Significant at 10%, **Significant at 5%, ***Significant at 1%

While the importance of instructor varied from model to model, it was always significant in explaining course grade. It is of interest to note that when it came to instructor, there was little correlation between the number of questions a student answered correctly on the posttest and the course grade assigned by the instructor. For example, students in instructor two's class earned higher grades, but had poorer outcomes on the posttest confronting us again with the question as to what grade actually measures. Class size was not significant in any model. The number of questions answered correctly on the pretest, a proxy for the student's initial stock of economic capital, was important in explaining the number of questions a student answered correctly on the posttest. Likewise, the number of questions answered correctly on the posttest, a proxy for the student's ending stock of economic capital, was important in explaining course grade.

Discussion of the high school variables is saved for last, as the focus of this study is how completing a high school economics course impacts performance in the college principles of macroeconomics course. Somewhat surprisingly, our study found that students enrolled in a college track in high school had no advantage in the macroeconomics principles course. Even more disappointing was the finding that students taking a one-semester high school economics course had no advantage when it came to pretest, posttest, gapclose, or course grade. Given that states are now devoting more resources to teaching economics in high school and given that Lopus (1997) found completion of a high school economics course was positively related to scores on all TUCE-III pretests and on microeconomics TUCE-III posttests, we were hoping to find students completing a course in high school economics outperforming students without a high school economics background.

VI. Conclusions

To our disappointment, the estimated models showed that students who had completed a one-semester high school economics course had no advantage over their counterparts on pretest score, posttest score, gapclose - a measure of student learning, or course grade. Although our sample comprises only those students taking principles of macroeconomics at a single university, the fact that high school economics does not seem to be making any significant contribution to student learning in this class is disconcerting.

Our hope is that these results, as well as information recently released by the Education Department stating that student economic literacy has remained flat over the years 2006 – 2012 will spur more investigation into the state of economic education in the U.S. (NAEP - *Nation's Report Card*, 2012) More resources are being devoted to this activity with little apparent effect. Why is this? Does teacher training play a role in the outcomes we are seeing? Many states continue to require only a minimum of training to those expected to educate students on this topic. For example, our sample included students who graduated high school in 11 different states. Of these 11 states, six undergraduate hours of economics was the most stringent training requirement imposed for anyone graduating from college and required to teach high school economics. Several of these 11 states required only one three-hour college course in economics for those teaching high school economics. What about economic standards? Although economic standards are in place, very few states have put any "teeth" into these standards. Only in rare instances do students have to demonstrate proficiency in the area of economics in order to graduate high school. Does this play a role in explaining the results found in this study and on the nation's report card? It is our hope that this paper will be one impetus for a discussion as to why completion of a high school economics course appears to have such minimal impact on economic literacy. Once there is greater understanding as to the cause of these poor outcomes, it is hoped that policies increasing the efficacy of K – 12 economics education can be explored and implemented.

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Endnotes

1. Copies of the survey and the pretest/posttest are available from the authors upon request.
2. At a reviewer's suggestion, high school economics was combined into one variable. An earlier version of the paper separated the high school economics variable into macroeconomics, microeconomics, and other. OLS regression of this model found high school macroeconomics to be significant and negatively related to pretest score. None of the other high school variables was significant in any regression. Because so few students had taken high school macroeconomics (9 students) or high school microeconomics (9 students), students taking any type of one-semester high school economics class were combined into one variable.
3. TUCE, Test of Understanding in College Economics, is one of four grade-level standardized economics tests. Other tests include BET, the Basic Economics Test used for upper grade levels in elementary schools, TEK, the Test of Economic Knowledge used in middle schools and lower grade levels in high school, and TEL, the Test of Economic Literacy used in upper grade levels in high school. The TEU, Test of Economic Understanding, was a nationally developed test of economic knowledge that is no longer in use.
4. There were concerns that issues of multicollinearity between the independent variables could affect the estimated results. To address this issue, variance inflationary factors (VIFs) were calculated for each model. Conservatively, a VIF greater than 5 indicates issues of multicollinearity that should be addressed. The largest VIF calculated in this study was 1.6.